REMARKS

Claims 1-21 and 32-36 were pending and remain for consideration in the present amendment. Reconsideration and allowance of the claims is respectfully requested in view of the amendments and the following remarks.

First Claim Rejection Under 35 U.S.C. §103(a)

Claims 1-3, 6, 7, 10-14, 16, 18, 19, 21, and 32-35 stand rejected under 35 U.S.C. §103(a), as allegedly unpatentable over Hoke in view of U.S. Patent No. 5,370,738 to Watanabe et al. (hereinafter "Watanabe"). Applicants respectfully traverse.

Independent reactor assembly Claims 1 and 32 are directed to reactor assemblies comprising, *inter alia*, an inlet manifold assembly comprising a flow-shaping portion adapted to laterally elongate a gas and/or a reactant flow into the process chamber, wherein the fluid communication between the inlet manifold assembly and the first sidewall opening of the process chamber is free from a baffle plate.

Hoke is generally directed to a metalorganic vapor deposition reactor vessel. The reactor vessel generally includes a chamber having a top surface that is substantially parallel to a substrate disposed within the chamber. A baffle plate is disposed adjacent to an inlet to increase uniformity and decrease turbulence of a vapor stream flowing through the chamber. A block is disposed within the chamber, which is positioned between the baffle plate and a substrate support assembly. To obtain its desired flow pattern, Hoke employs a baffle plate.

Watanabe is generally directed to a compound semiconductor vapor phase epitaxial device. The device employs a rather complicated inlet structure for admitting different gas compositions, e.g., H_2, compound including Group III elements + H_2, and compound including Group V elements + H_2. The gas flow for supplying the material gases employed for vapor deposition is characterized as flowing through a plurality of flow channels, some of which provide a flow pattern transverse to the substrate.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success resulting from the combination. Finally, the prior art references must teach or suggest all claim limitations.

A prima facie case has not been established in the present Office Action. Applicants' submit that there is no motivation or suggestion to combine the teachings of the cited references. The mere fact that the references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability. *In re Mills*, 916 F.2d 680, 16 USPQ 1430 (Fed. Cir. 1990). Applicants' can find no such desirability in the cited references. Moreover, the references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975).

The Office Action combines Watanabe with Hoke to teach the feature of a chamber having a cylindrical shaped interior region, a feature in the Office Action acknowledged to be missing from Hoke. The motivation for this combination purportedly is to generate a laminar flow of reactant gases as taught by Watanabe. However, the Office Action ignores the fact that Hoke reference teaches away from the use of a chamber having a cylindrical shaped interior region, thereby making this combination improper. Rather, Hoke purposely utilizes a chamber having a rectangular shaped interior region, which is described as providing numerous advantages over cylindrical shaped interior regions. Because of this, there is no motivation whatsoever to modify Hoke's chamber to have a cylindrical shaped interior region, especially since the rectangularly shaped interior region is a critical feature of Hoke's reactor/chamber.

> Here the growth chamber 11 is rectangular shaped as shown. There are several advantages to using a growth chamber 11 having such a top surface 25 disposed substantially parallel to the substrate 63, rather than the more conventional cylindrical shaped chamber. In a rectangular chamber 11, the distance from the surface of the substrate 63 to the top surface 25 of the chamber 11 is uniform across the surface of the substrate 63. Since wall surfaces provide drag on gas flow, decreasing

> the uniformity of the velocity of such flow and potentially resulting in non-uniform deposition, the gas flow pattern in a rectangular chamber 11 will typically be more uniform than that in a cylindrical chamber. Also, an increase in the size of the substrate 63 will require less additional chamber volume with a rectangular chamber 11 since only the width of such a chamber would increase, whereas in a cylindrical chamber the overall diameter would increase.

(Hoke, Col. 7, ll. 30-53)

From the above passage, it is clear that Hoke teaches away from a reactor that includes a chamber having a cylindrical shaped interior region. Modifying Hoke to have the cylindrical shaped interior region would eliminate many of the advantages Hoke has noted above and will likely deleteriously affect gas flow uniformity. In view of the foregoing, there is no motivation to modify Hoke's MOCVD reactor to include a chamber having a cylindrical shaped interior region.

Moreover, Hoke employs a baffle plate in its reactor, which is critical for providing Hoke's desired laminar flow pattern. Removal of the baffle plate, as proposed by the Examiner in his combination of Hoke with Watanabe, would likely render the MOCVD reactor unsatisfactory for its intended purpose. More specifically, Hoke comments that:

> [t]he baffle 12 is here used to diffuse an incoming vapor through inlet 14, to increase the laminar flow characteristic of said incoming vapor stream. The gas diffusing baffle 12 has a plurality of apertures or small holes 12a disposed therethrough. The holes 12a may be disposed in a pattern or random arrangement. Here the holes 12a are disposed in an ordered grid arrangement. During growth, vapor enters the reactor vessel 10 via the reactor inlet 14 (which is connected to tube portion 40g of vapor apparatus 35 of FIG. 2) at a high flow rate, approximately 10 liters/minute for example. At such flow rate, pressure builds up in the inlet area 15, behind the gas diffusing baffle 12, resulting in gas flow through all of the plurality of holes 12a of the gas diffusing baffle 12 thus providing a substantially laminar gas flow. As mentioned above, the inlet area 15 is linearly tapered; however, due to the diffusion of the gas by the baffle 12 once pressure has built up in the inlet area 15, the effect of the shape of such inlet area 15 on the uniformity of the resulting gas flow, is believed to be relatively insignificant. The gas diffusing baffle 12 and the inlet area 15 in which vapor pressure builds, prevent the gas from

> streamlining along the center of the rectangular chamber 11. Thus, to insure laminar flow by use of the baffle 12, it is believed to be sufficient to provide any shaped inlet area 15 between the inlet 14 and the baffle 12. Such area will prevent streamlining of the vapor through the baffle 12. Thus, the baffle 12 is disposed adjacent to but spaced from the inlet 14 of the reactor vessel 10. In applications where the width of the chamber 11 is increased due to an increase in the substrate 63 size, but the size of the inlet 14 remains the same, the streamlining effect will be more significant, emphasizing the importance of such a baffle 12.

(Hoke, carryover paragraph of Cols. 7-8, Emphasis added)

Without the baffle plate, the laminar flow characteristic of the incoming vapor stream would deleteriously decrease. Purportedly, motivation for modifying Hoke to remove the baffle plate was because Watanabe "supports laminar flow absent a baffle plate." However, it is unclear as to whether Watanabe even supports laminar flow. Watanabe is directed to a reactor including an inlet having multiple gas channels. The resulting flow of gases through the multiple gas channels that impacts the substrate is non-laminar. At Column 4, ll. 35-55, Watanabe indicates that a ratio of the gas flow velocities of a first channel (Watanabe, Figures 6-8, Ref. No. 17) relative to a second channel (Watanabe, Figures 6-8, Ref. No. 27) is 5 to 200, wherein the second channel provides an axial flow pattern. Because Watanabe discloses gas flowing through the second channel at defined ratios, a non-laminar flow pattern necessarily results when the gases from the two flow channels are combined. Thus, removing the baffle plate as proposed by the modification would eliminate any reasonable expectation of success in producing the laminar gas flow pattern as described by Hoke.

Applicants further maintain that the Examiner has used an improper standard in arriving at the rejection of the above claims under section 103, based on improper hind sight, which fails to consider the totality of applicant's invention and to the totality of the cited references. Stated in another way, "[i]t is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." *In re Fritch* 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992). More specifically, the Examiner has used Applicant's disclosure to select portions of the cited references to allegedly arrive at Applicant's invention. In doing so, the Examiner has failed to consider the teachings of

the references or Applicant's invention as a whole in contravention of section 103, including the disclosures of the references that teach away from Applicant's invention, e.g., Hoke.

In view of the foregoing, modifying the Hoke reactor to include a chamber having a cylindrical shaped interior region and removing the baffle plate will undoubtedly affect the resulting laminar flow pattern such that there is no reasonable expectation of success, especially in view of the importance disclosed in Hoke of the baffle plate and its rectangularly shaped interior region in producing a laminar flow pattern. In accordance with MPEP §2143.20, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended use, then there is no suggestion or motivation to make the proposed modification. Such is the end result in the present combination of references.

As a prima facie case of obviousness has not been established against independent Claims 1 and 32, these claims are patentable over the cited references. Given that Claims 2, 3, 6, 7, 10-14, 16, 18, 19, 21 and 33-35 each further limit and ultimately depend from one of these independent claims, they too are patentable.

Other Claim Rejections Under 35 U.S.C. §103(a)

Claims 4, 5, 8, 9, 15, 17, 20, and 36 stand rejected under 35 U.S.C. §103(a), as allegedly unpatentable over Hoke and Watanabe in varying combinations of references including U.S. Patent No. 6,383,330 to Raaijmakers et al., an STIC translation of JP02-15221 to Mikio Takagi et al., U.S. Patent No. 5,228,501 to Tepman et al., U.S. Patent No. 4,839,145 to Gale et al., U.S. Patent No. 5,190,592 to Chazee et al., U.S. Patent No. 6,355,108 to Won et al. Applicants respectfully traverse.

For reasons previously discussed, a prima facie case of obviousness has not been established against independent Claims 1 and 32 based on the Hoke and Watanabe references. Simply put, there is no motivation to combine these references to make the modifications as proposed in the Office Action. Even assuming, *in arguendo*, the references were properly combined, there is no expectation of success. Since those claims dependent thereon include the

same features, among others, dependent Claims 4, 5, 8, 9, 15, 17, 20, and 36 are also patentable over the cited references for at least the same reasons.

In view of the foregoing, the rejections of Claims 4, 5, 8, 9, 15, 17, 20, and 36 are requested to be withdrawn.

It is believed that the foregoing remarks fully comply with the Office Action and place the application in condition for immediate allowance, which action is earnestly solicited.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

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